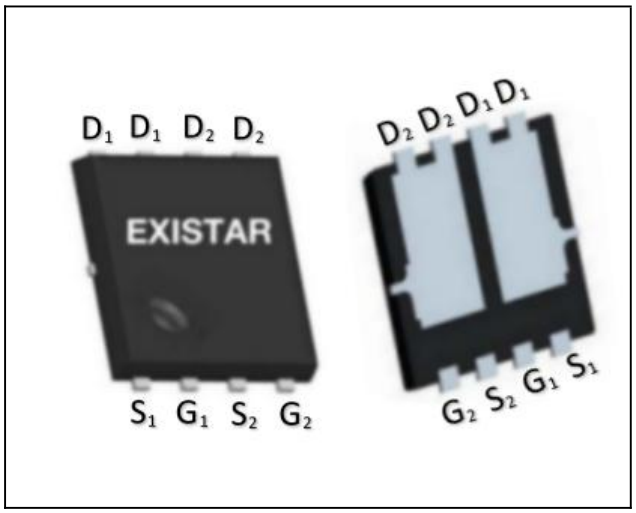
N-Channel 60V MOSFET

E060N9P0KL1

	V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
N1	60V	9.5 @ V_{GS} = 10V	56
N2	60V	9.5 @ V_{GS} = 10V	56

PDFN5*6D

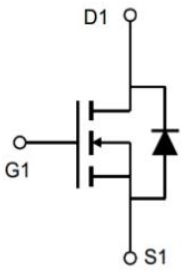


Features

- Low $R_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

Applications

- DC/DC conversion
- Power switch
- Moto driver



Pb-free
RoHS COMPLIANT
HALOGEN FREE

Package And Ordering Information

Ordering code	Package	Marking
E060N9P0KL1	PDFN5*6D	E060N9P0KL1

Ordering Information

Package	Units/ Reel	Reels/ Inner Box	Units/ Inner Box
PDFN5*6D	5000	1	5000

Key Performance Parameters

Parameter	Value	Unit
VDS, min @ Tj(max)	60	V
ID, pulse	220	A
RDS(ON), max @ VGS=10V	9.5	mΩ
Qg	18.5	nC

Absolute Maximum Ratings at Tj=25°C Unless Otherwise Noted

Parameter		Symbol	Limit	Unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25°C	I_D	56	A
	T_C=70°C		39.5	
Pulsed drain current		$I_{D,pulse}$	220	
Avalanche energy, single pulse	L=0.3mH	E_{AS}	83	mJ
Power dissipation	T_C=25°C	P_D	60	W
	T_C=70°C		30	
Operating junction and storage temperature range		T_J, T_{stg}	-55 To 175	℃

Thermal Characteristics

Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	2.5	°C/W
Thermal resistance, junction-to-ambient	Steady state	$R_{\theta JA}$	50	

Electrical Characteristics at Tj=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Static						
Drain to source breakdown voltage	$V_{(BR)DSS}$	60			V	V_{GS} = 0, I_D = 250 μA
Gate-source threshold voltage	$V_{GS(th)}$	1	1.9	3	V	V_{DS} = V_{GS}, I_D = 250 μA
Gate-body leakage	I_{GSS}			±100	nA	V_{DS} = 0 V, V_{GS} = ±20 V
Zero gate voltage drain current	I_{DSS}			1	μA	V_{DS} = 60 V, V_{GS} = 0 V
Drain-source on-resistance	$R_{DS(on)}$		8.8	9.5	mΩ	V_{GS} = 10 V, I_D = 20 A
Drain-source on-resistance	$R_{DS(on)}$		11.2	13.5	mΩ	V_{GS} = 4.5 V, I_D = 20 A
Gate resistance	Rg		2.1		Ω	f=1MHz

Gate Charge						
Total gate charge	Qg		18.5		nC	V_{DS} = 48 V, I_D = 20 A, V_{GS} = 10 V
Gate-source charge	Qgs		3.9			
Gate-drain charge	Qgd		4.8			
Dynamic						
Turn-on delay time	$t_{d(on)}$		7.7		ns	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 20 A, R_{GEN} = 4 Ω
Rise time	t_r		31.7			
Turn-off delay time	$t_{d(off)}$		18.4			
Fall time	t_f		34.8			
Input capacitance	C_{iss}		926		pF	V_{DS} =25 V, V_{GS} = 0 V, f = 1.0MHz
Output capacitance	C_{oss}		505			
Reverse transfer capacitance	C_{rss}		39			
Body Diode						
Diode forward voltage	V_{SD}		0.87		V	V_{GS} = 0 V, I_S = 20 A
Reverse recovery time	t_{rr}		22.9		ns	I_F =20 A, di/dt = 100 A/μs
Reverse recovery charge	Q_{rr}		15		nC	

Electrical Characteristics Diagrams

Figure 1: Power Dissipation

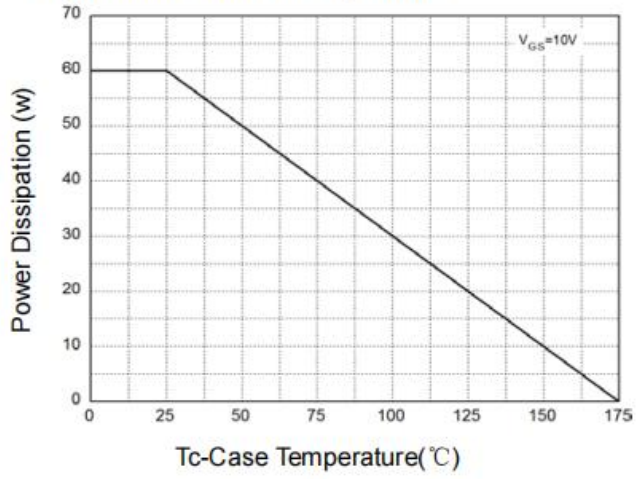


Figure 2: Drain Current

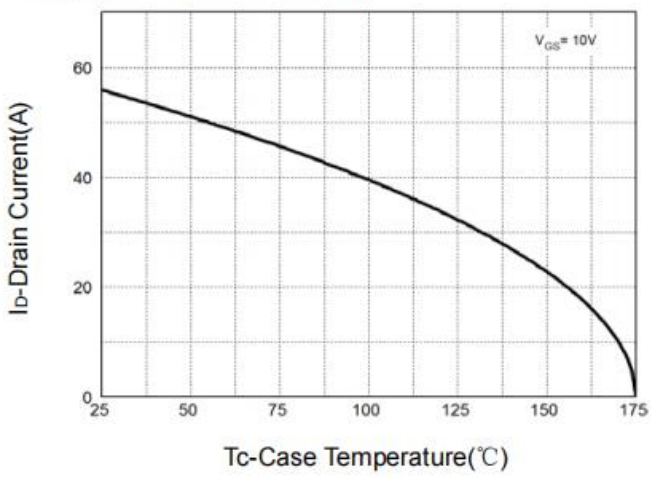


Figure 3: Safe Operation Area

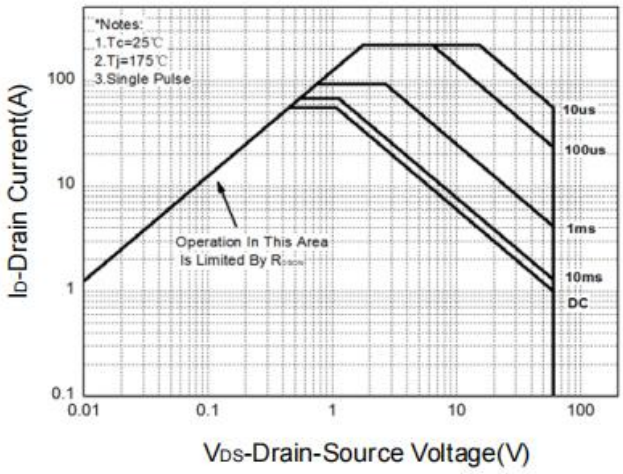
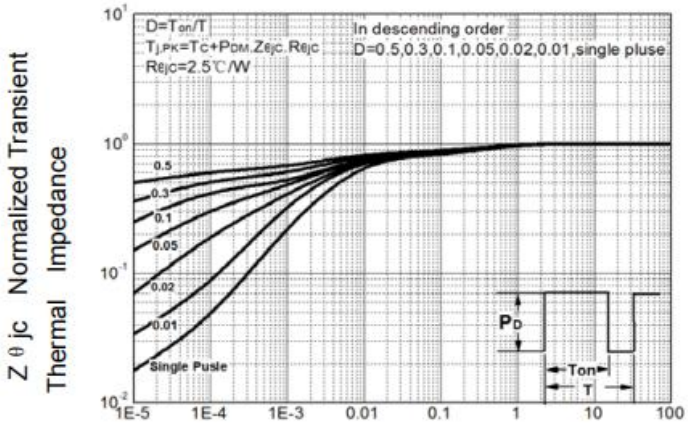


Figure 4: Thermal Transient Impedance



Maximum Effective Transient Thermal Impedance, Junction-to-Case

Figure 5: Output Characteristics

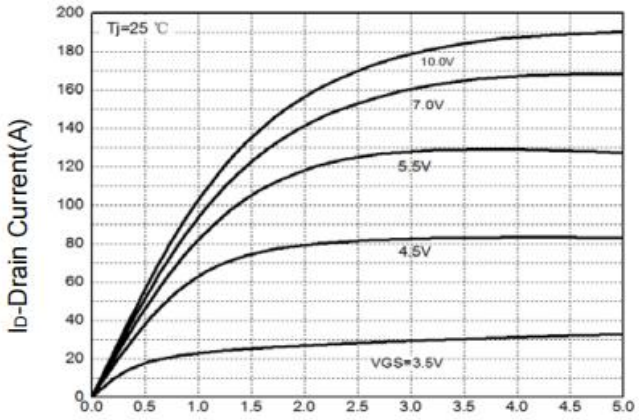


Figure 6: Drain-Source On Resistance

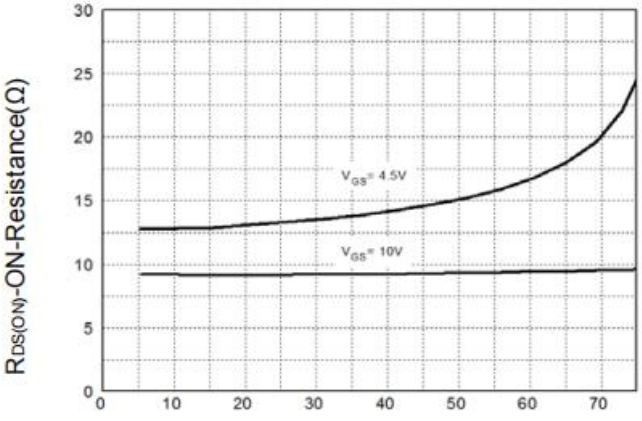


Figure 7: On-Resistance vs. Temperature

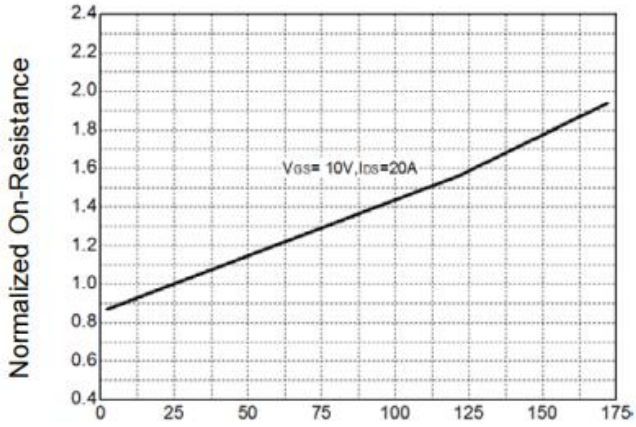


Figure 8: Source-Drain Diode Forward

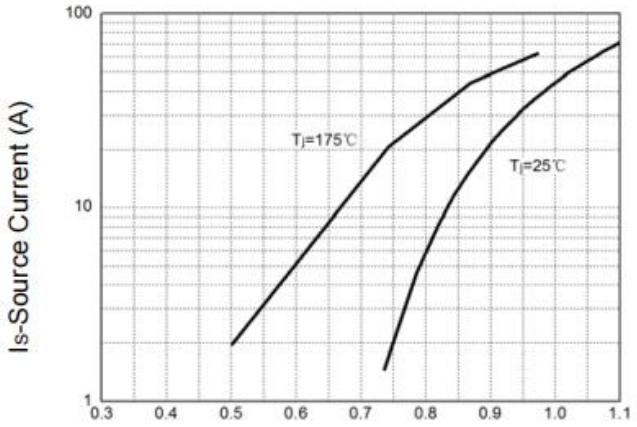


Figure 9: Capacitance Characteristics

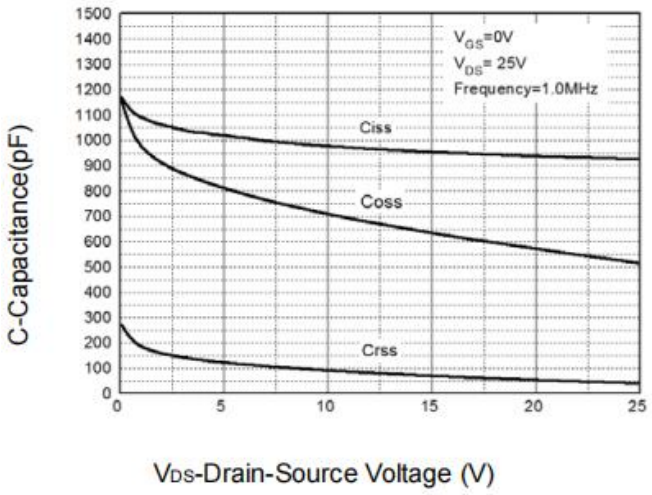
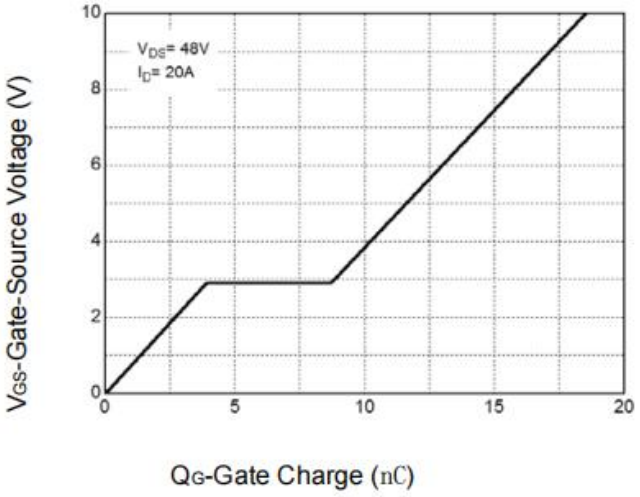
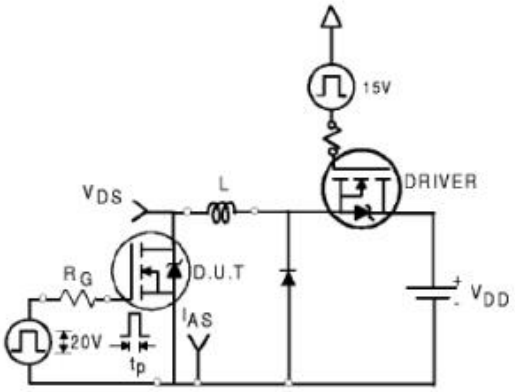
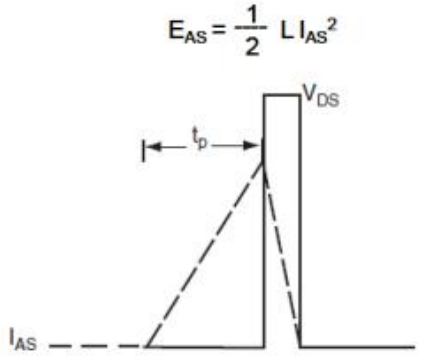


Figure 10: Gate Charge Characteristics

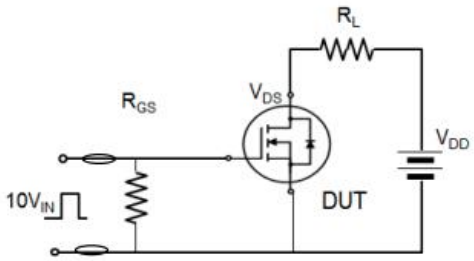


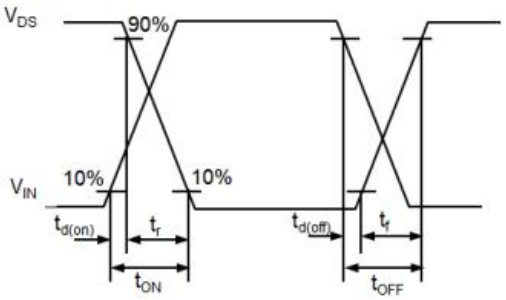
Avalanche Test Circuit



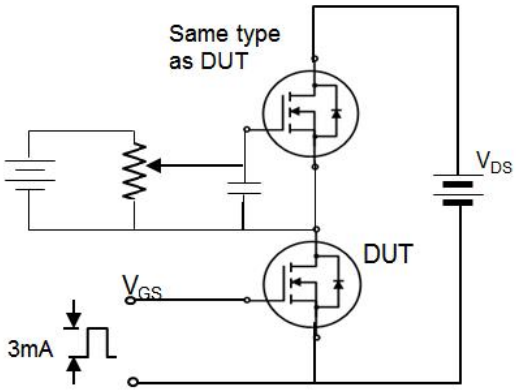


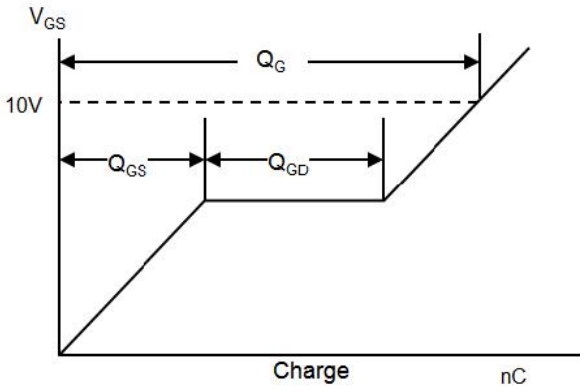
Switching Time Test Circuit



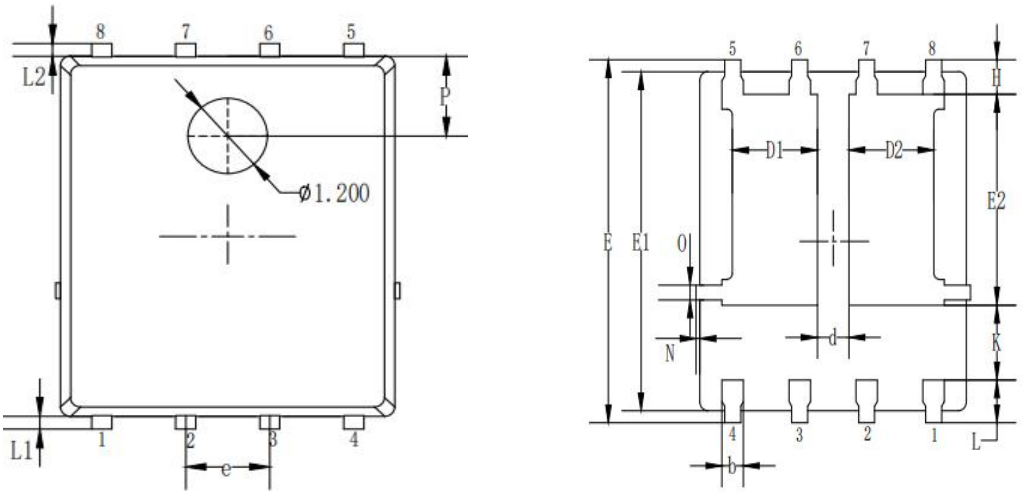


Gate Charge Test Circuit





Package Outline Dimensions



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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